

FOG

NPMOC Yokosuka Training Department





OBJECTIVES

- DEFINITIONS
- TYPES OF FOG
- FORECASTING

ATMOSPHERE

- MIXTURE OF NITROGEN, OXYGEN, TRACE GASES AND WATER VAPOR. QUANTITY-WISE, WATER VAPOR IS THE MOST VARIABLE.
- WATER VAPOR CONTENT DEPENDS ON TEMPERATURE AND PRESSURE.

WATER VAPOR CONTENT

- **WARMER AIR CAN HOLD MORE WATER VAPOR THAN COOLER AIR.**
- **HIGHER PRESSURE AIR CAN HOLD MORE WATER VAPOR THAN LOWER PRESSURE AIR.**

MIXING RATIO

- **IN AIR, THE RATIO OF THE MASS OF THE WATER VAPOR TO THE MASS OF THE DRY AIR.**

SATURATION

- **IN AIR, THE MAXIMUM AMOUNT OF WATER POSSIBLE UNDER THE EXISTANT PRESSURE AND TEMPERATURE.**

RELATIVE HUMIDITY

- THE RATIO OF THE AMOUNT OF WATER VAPOR ACTUALLY PRESENT IN THE AIR TO THE GREATEST AMOUNT POSSIBLE UNDER THE SAME TEMPERATURE AND PRESSURE.

CONDENSATION

- **THE CONVERSION OF WATER FROM THE VAPOR STATE TO THE LIQUID STATE, USUALLY BROUGHT ABOUT BY A REDUCTION IN TEMPERATURE.**

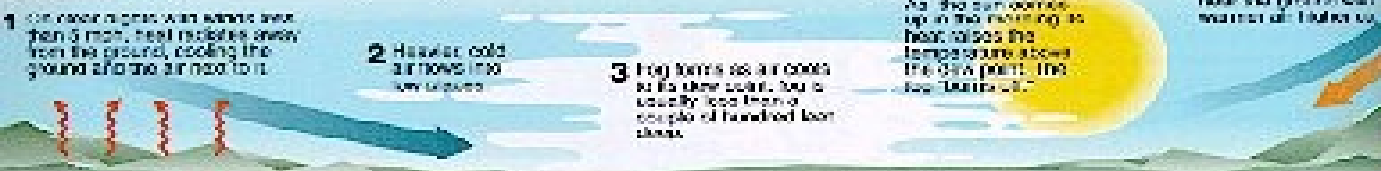
DEW POINT

- **THE TEMPERATURE AT WHICH WATER VAPOR BEGINS TO CONDENSE.**

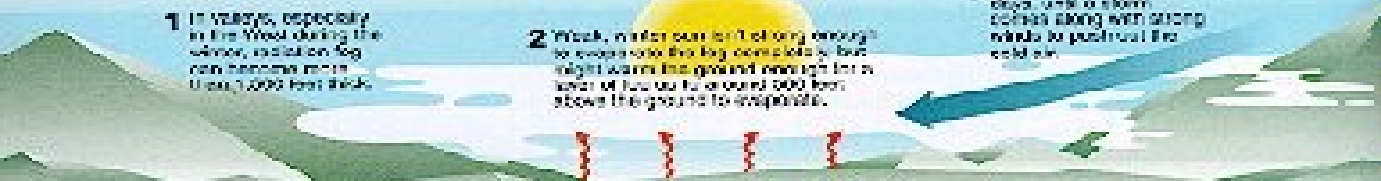
WHAT IS FOG

- SURFACE BASED STRATUS CLOUD.
- FORMS WHEN CONDITIONS ARE STABLE
LIGHT WINDS
- HIGH RELATIVE HUMIDITY
- CONDITIONS WHICH BRING THE AIR TO
IT'S DEWPOINT.

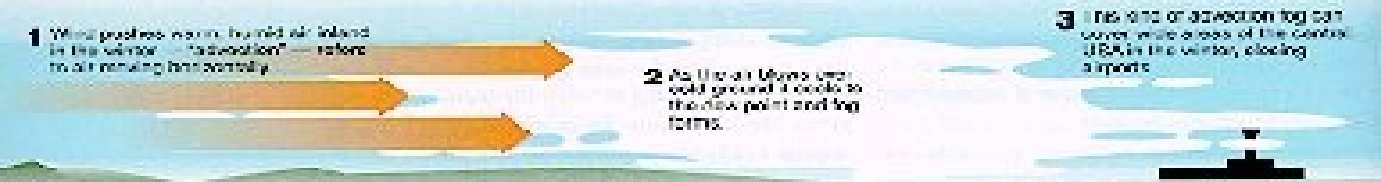
RADIATION, OR GROUND, FOG



VALLEY FOG



ADVECTION FOG



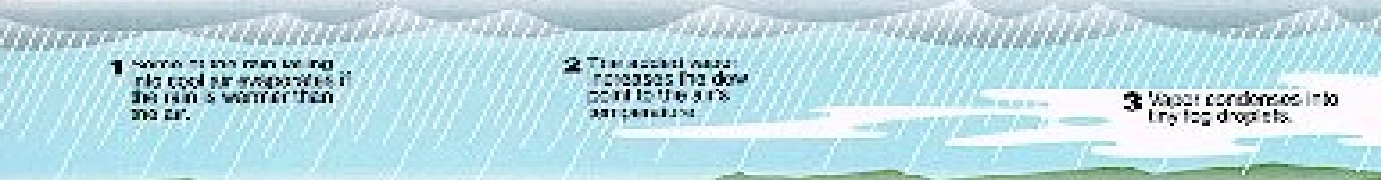
UPSLOPE FOG



SEA SMOKE, OR STEAM FOG



PRECIPITATION FOG



Types of Fog

Radiation/Ground

Valley

Advection

Upslope

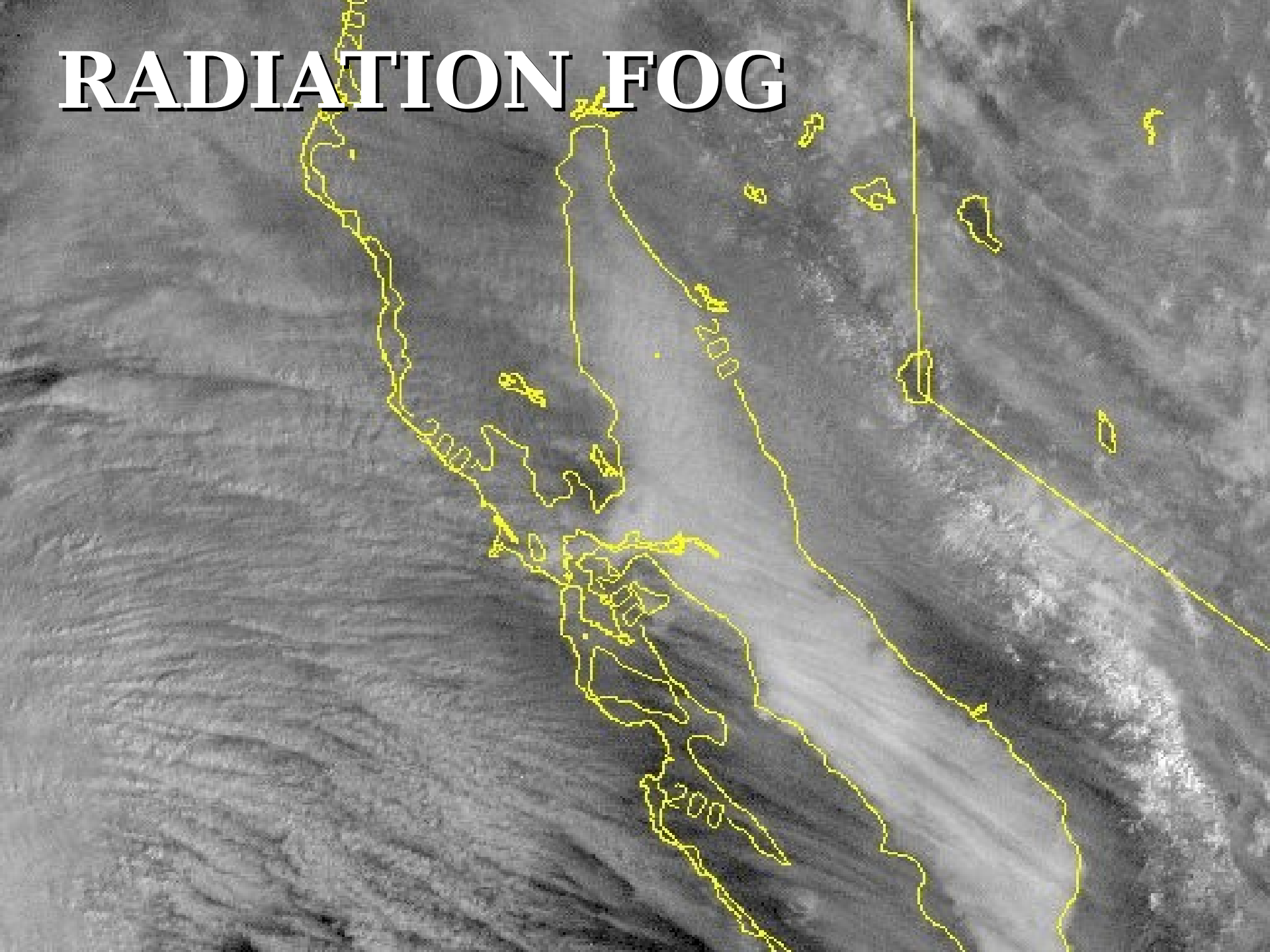
Steam/Sea Smoke

Precipitation

RADIATION FOG

1. Commonly referred to as ground or valley fog
2. Caused by radiant cooling of the Earth surface.
3. Never forms over a water surface.
4. Common in areas of HIGH PRESSURE.

RADIATION FOG



ADVECTION FOG

- **COOLING FROM BELOW BUILDS LAYER**
- **THE SURFACE BEING COOLER THAN THE AIR ABOVE CAUSES THE TRANSFER OF HEAT FROM AIR TO SURFACE WHICH COOLS THE AIR TO ITS DEW POINT AND PRODUCES FOG.**

ADVECTION FOG



LAND ADVECTION FOG

1. FOUND NEAR LARGE BODIES OF WATER.
2. CANNOT EXIST IN HIGH WIND SPEEDS
3. FORMS WHEN ON SHORE BREEZES
MOVE MARITIME AIR OVER A
RADIATIONAL COOLED LAND SURFACE.

ADVECTION-RADIATION FOG

- Occur when air that has come inland from the sea during the day undergoes nighttime radiational cooling.
- Occurs mainly in late summer/autumn.
- Local example is a POST-LEVANTE FOG.

UPSLOPE FOG

- FOG THAT FORMS AS MOIST AIR FLOWS UP AN ELEVATED PLAIN, HILL, OR MOUNTAIN.
- CAUSED BY ADIABATIC COOLING OF RISING AIR.
- MAY OCCUR IN RELATIVELY HIGH WIND SPEEDS.

SEA FOG

1. TYPE OF ADVECTION FOG
2. OCCURS WHEN SEA AIR IS COOLED OVER A COLD OCEAN CURRENT.
3. GREATER TEMPERATURE DIFFERENCE= DEEPER, DENSER FOG.

STEAM FOG

- OCCURS WHEN COLD AIR MOVES OVER WARM WATER.
- FORMS ON CLEAR NIGHTS INLAND OVER LAKES AND RIVERS.

FRONTAL FOG

- **CAN FORM IN ADVANCE OF A WARM FRONT (OR BEHIND A WARM FRONT IF THE WARM AIR DEW POINT IS HIGHER THAN THE COLD AIR TEMPERATURE.)**
- **CAN FORM BEHIND A SLOW MOVING COLD FRONT WHEN THE AIR BECOMES SATURATED**

Favorable Conditions for Formation Locally

- Clear Skies
- Weak onshore flow during the day
- Rapid cooling after sunset
- Following moderate or heavy rain
- Northeasterly drainage wind after sunset (less than 8 kts.)

QUESTIONS?

Q. What is Relative Humidity?

A. $M_{wv}(\text{actual})/M_{wv}(\text{max})$

Q. What is Saturation?

A. Max amount of water possible under the existant pressure and temperature.

Q. What is the Dew Point?

A. The temperature at which water vapor begins to condense.

QUESTIONS?

Q. Will fog typically form with a warm or a cold front?

A. Warm Front

Q. Fog requires what type of winds to form?

A. Light winds

Q. During what season is post-levante fog most common

A. Summer